A STUDY OF NAVY AND MARINE CORPS PERSONNEL ADMITTED TO THE PSYCHIATRIC SICK LIST

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13 ABSTRACT

In a study of psychiatric decisions in Navy psychiatry, a large-scale prognostic research project was initiated on Navy and Marine Corps enlisted men admitted to Navy psychiatric facilities during 1967-68. The three major objectives of the study were: (1) to examine the decisions concerning disposition of Navy and Marine psychiatric patients and to develop guidelines for such decisions, (2) to determine post-hospital outcomes for men returned to duty after psychiatric hospitalization, and (3) to identify patient characteristics predictive of post-hospital success and to develop prognostic equations and actuarial tables in order to maximize post-hospital success rates. In general, items reflecting standard demographic information and background information provided a sound basis from which prognostic scales could be derived.

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A Study of Navy and Marine Corps Personnel Admitted to the Psychiatric Sick List

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Large numbers of men are separated from the naval service for psychiatric reasons each year.[1,4,5] In one peace-time year, 1961, psychiatric disorders accounted for 9,000 hospitalizations, 300,000 sick days, and 4,500 invalidings (medical discharges) from the naval service. Enlisted personnel comprised a large proportion of this total (97%). Psychiatric files maintained by the Navy Medical Neuropsychiatric Research Unit, San Diego, California, indicate that the incidence rate has remained stable for the Navy since 1961, but the rate has increased sharply for the Marine Corps during the Vietnam conflict. Whatever the specific incidence rate during a given period of time, sound decisions must be made concerning the disposition of psychiatric patients in the naval service, not only because of the service's need for mentally healthy individuals to perform effectively, but, equally important, for the well-being of the members concerned.

The present report describes (1) the design of a large-scale prognostic study of Navy and Marine Corps enlisted men admitted to Navy psychiatric facilities and (2) the reliability and predictive validity of demographic, attitudinal, and clinical information contained in a questionnaire which was intended to provide the basis for improved prognostic and dispositional decisions.

I. STUDY DESIGN

Primary Data Collection

This project was initiated in 1967 with field visits to all naval facilities involved. The three major objectives of the study were: (1) to examine decisions concerning disposition of Navy and Marine psychiatric patients and to develop improved guidelines for such decisions, (2) to determine post-hospital outcomes (effectiveness rates) for men returned to duty after psychiatric hospitalization, and (3) to identify patient characteristics predictive of post-hospital success and to develop prognostic equations and actuarial tables in order to maximize post-hospital success rates.

The study design called for collection of data from male Navy and Marine Corps enlisted and officer personnel admitted to major Navy psychiatric services around the world during an 18-month period. Of 26 psychiatric services initially designated for the study, useful information was received from 23, including overseas hospitals and a hospital ship. Three small hospitals contributed relatively few cases and were dropped from the study. The primary data consisted of an extensive biographical questionnaire which was filled out by the patient during his hospitalization. At the time of discharge from the hospital, essential administrative and clinical data, including discharge diagnosis, recommended disposition, and method of disposition (narrative summary or medical board), were recorded on the questionnaire form by psychiatric staff. If the patient was transferred to another hospital, he was required to fill out the questionnaire again upon admission to the psychiatric service. After completion by the patient and the psychiatric service, all questionnaires were forwarded to the Navy Medical Neuropsychiatric Research Unit for analysis.

Disposition from the Hospital

Dispositions from the psychiatric units were divided into two broad categories:

(1) Return to Duty (RTD). A patient returned to full duty without qualification or restriction was placed in this classification. The members in this category were followed for the remainder of their enlistments after discharge from the hospital. Thirty-two percent (32%) of the sailors and 41 percent of the Marines were classified RTD.

(2) Not Returned to Duty (NRTD). All other patients were considered to fall in this class, except those sent to limited duty. The latter cases were set aside for separate consideration. NRTD includes separation from active service at the time of discharge from the hospital, referral to the physical disability retirement system of the Navy, return to duty to await administrative or disciplinary action pending at the time of admission to the hospital, or return to duty with the recommendation that consideration be given to administrative separation from active service.

Follow-up Procedures

Follow-up data on all patients were extracted from six sources:

(1) Psychiatric inpatient files maintained by the Bureau of Medicine and Surgery for information concerning re-hospitalization, final action on reports of medical boards, and recommended actions in cases referred to the physical disability retirement system,

(2) Navy Enlisted Locator Files indicating current active duty stations,

(3) Similar files maintained by the Marine Corps for the same purpose,

(4) Computer files containing information pertaining to changes in the administrative status of Navy personnel, including types and dates of discharge from service and recommendations concerning re-enlistment,

(5) Service records of Navy and Marine Corps personnel separated from active duty,

(6) Marine Corps files containing information about the date and nature of discharge awarded and re-enlistment recommendations.

From the initial primary data collected on the patients and the follow-up sources, a composite computer case file on all patients in the sample was constructed. Research data were then abstracted from the computer tape as required for analysis.

Post-Hospital Outcome

For all RTD cases, post-hospital effectiveness at duty was determined. Effectiveness (E) was defined as (1) completing the current enlistment and (2) being recommended for re-enlistment at the time of discharge from service. Members with less than six months remaining on their current enlistment at the time of return to duty were set aside for separate study and were not considered in this sample. This restriction was imposed because superiors might tolerate below-standard performance or behavior for short periods of time rather than initiate action to prematurely separate a man from the service. Of the total Navy RTD sample, 62 percent were classified successes while 48 percent of the Marines were so classified.

All other RTD cases (again with six months or more remaining to complete their current enlistments) were defined as noneffective or failures (F).

Patient Samples and Data Analyses

Initial data were collected on patients admitted to psychiatric services from April 1967 through September 1968. Research forms were received for 4,950 Navy men and 3,382 Marines. Of these cases 2,824 sailors (57 percent) and 1,526 Marines (45 percent) had complete biographical and clinical information and criterion data and had at least six months of obligated active

duty remaining on their enlistment after their hospitalization.

Demographic and clinical data for the two patient samples are summarized in Table 1. Generally, the Navy patients were older and had been in service longer than Marine Corps patients. There was a tendency for Marines to be returned to duty more frequently, regardless of age, diagnosis, or years of service. Clearly the most important factor in decisions to return men to duty for both Navy and Marine Corps personnel was diagnosis. Less than 10 percent of the cases diagnosed Psychotic were returned to duty compared with about 80 percent of those diagnosed Adult Situational Maladjustment. Pay grade was the next most important factor in return to duty decisions. Taken together, diagnosis and pay grade had a powerful influence on decisions concerning disposition. These differences in selection factors for return to duty might be expected to affect the overall success rates for the two services.[2]

Each of the total patient samples was randomly divided into validation and cross-validation subsamples. All analyses concerned with reliability of the biographical information were performed on a separate sample of duplicate records.

Stable predictions can only be made from reliable data. Before predictions were attempted in this study, the reliabilities of the data items were analyzed.

Multiple questionnaires were received on 614 Navy men and on 804 Marines who were either transferred from one hospital to another or were readmitted to the psychiatric sick list after their original RTD. These questionnaires afforded an opportunity to assess the test-retest reliability of the questionnaire items. The time interval between completion of the questionnaires ranged from 0 - 206 days, with a median of 24 days for sailors

Table I

Relationship between Demographic and
Clinical Variables and Return to Duty Decisions

Navy (N = 2,824)		Marines (N = 1,526)	
Age:	**% RTD**	**Age:**	**% RTD**
17-18	16	17-18	36
19-20	21	19-20	40
21-25	27	21-25	40
26-30	35	26-30	66
31+	69	31+	59
Years of Service:		**Years of Service:**	
0-1	18	0-1	36
2-3	31	2-3	46
4-9	37	4-9	49
10+	61	10+	63
Pay Grade (Rank):		**Pay Grade (Rank):**	
E-1	13	E-1	32
E-2	19	E-2	36
E-3	22	E-3	46
E-4 through E-5	39	E-4 through E-5	53
E-6 through E-9	62	E-6 through E-9	68
Diagnosis:		**Diagnosis:**	
Psychosis	9	Psychosis	6
Neurosis	32	Neurosis	56
Character and Benavior Disorder	24	Character and Behavior Disorder	32
Situational Maladjustment	79	Situational Maladjustment	83
Marital Status:		**Marital Status:**	
Ever married	39	Ever married	45
Single	23	Single	40
Number of days Hospitalized:		**Number of days Hospitalized:**	
0-7	55	0-7	72
8-14	49	8-14	61
15-30	33	15-30	44
31-60	17	31-60	23
61+	10	61+	11

and 14 days for Marines. Data on 52 variables were collected and examined.

Reliability coefficients for graded and dichotomous variables were computed by Pearson's product-moment correlation and are listed in Table 2. With few exceptions, the correlations for the Navy and Marine Corps personnel were similar. For the Navy, 21 of the 33 item correlations were in the high range (.70 and higher). For the Marine Corps, 21 of the 35 correlations were .70 or above. The remaining items had correlations in the moderate range (below .70). Dichotomous items with relatively small proportions of positive responses were among those variables with the lowest correlations.

Reliabilities for categorical items, computed by the contingency coefficient (C), are not directly comparable to those computed by the product-moment method, and are presented separately in Table 3. The maximum C attainable for each variable, as determined by the number of categories within that variable, is given in Table 3 as a guideline for evaluating the reliability coefficients. All but the last two variables had C's within .30 of their maximum values for both Navy and Marine Corps personnel, and might be regarded as having moderate to high reliability.

Discharge diagnoses had relatively low reliability, indicating that diagnosis was often changed upon transfer to another hospital. Changes in diagnosis can be expected during the course of psychiatric hospitalization, particularly from Psychosis or Neurosis to Character and Behavior Disorder.[3] Such changes may reflect knowledge gained of clinical history, close observation in the hospital, response to treatment, and administrative policies.

Both Tables 2 and 3 show that, in general, items reflecting standard demographic information, such as age, education, pay grade, race, and occupational group, had very high reliabilities. Items deroting personal or family background and pre-service information were slightly less reliable.

Table 2

Product-Moment Reliabilities for Graded or Dichotomous Variables

Variables	Navy (N = 614) r	Navy (N = 614) N[a]	Marines (N = 804) r	Marines (N = 804) N[a]
Age	.99	595	.99	782
Pay grade (rank)	.98	605	.98	772
Ever married	.98	593	.97	785
Military status (regular or reserve)	.97	594	.61	789
Years of service	.96	597	.96	783
Number of children	.94	211	.98	228
Education	.94	587	.96	781
Age entered service	.94	573	.92	767
Ever court-martialed	.92	569	.88	773
Number of Marine service schools	-	-	.91	226
Size of town before age 12	.88	543	.88	721
Size of town after age 12	.88	545	.88	745
Married now	.85	225	.80	234
Ever had office hours; Captain's Mast	.85	569	.77	765
Father's education	.83	585	.85	774
Mother's education	.82	578	.79	764
Parents living together	.81	587	.78	761
Pre-service job (yes or no)	.77	588	.75	784
Any pre-service hospitalization	.74	591	.78	781
Attended service schools	-	-	.75	780
Career designated in service	.72	529	.64	739
Number of men supervised	.71	536	.79	700
Wife living at duty station	.71	197	.59	204
Number of clubs joined	.64	575	.70	753
Proficiency pay	.64	565	.44	711
Awards received	.61	561	.63	753
Hospitalized while in service	.59	565	.61	749
Number of men worked with	.59	548	.59	671
Attitude toward last command	.59	530	.55	706
Continued education	.57	581	.67	774
Number of pre-service jobs	.54	265	.56	359
Problems understood at last command	.50	531	.57	707
Ability recognized at last command	.50	534	.56	695
Seen psychiatrist before	.47	579	.57	765
Decorated (medals and commendations)	.35	559	.50	759

[a]Numbers of subjects with complete data on both questionnaires.

Table 3

Contingency Coefficient Reliabilities
for Categorical Variables

Variables	Maximum C	Navy (N = 614) C	Navy (N = 614) N[a]	Marines (N = 804) C	Marines (N = 804) N[a]
Occupational group	.94	.94	603	.93	771
Region in U. S. where raised	.95	.94	549	.94	696
Religion	.95	.94	576	.93	771
Race	.89	.89	584	.86	783
Parents living	.89	.86	214	.88	301
Father's occupation	.95	.92	536	.91	726
Navy service schools attended	.91	.86	574	-	-
Duty station prior to hospitalization	.89	.78	583	.82	730
When court-martialed--if ever	.87	.78	65	.73	95
Why previously saw psychiatrist	.91	.79	198	.74	225
Wife's service attitude	.83	.69	186	.66	194
Frequency of duty in service	.87	.70	560	.73	668
Failed promotion	.82	.69	568	.61	749
Quota'd for promotion	.82	.72	555	.60	740
Health attitude	.82	.60	552	.63	754
Diagnostic group	.87	.65	600	.59	743
Work in rate	.87	.55	559	.50	659

[a]Number of subjects with complete data on both questionnaires.

The results reported above provided a sound basis for attempting to develop prognostic indices of post-hospital effectiveness for enlisted naval personnel.

II. HOSPITAL DISPOSITIONS AND POST-HOSPITAL SUCCESS

This section is addressed to two specific aspects of the decision-making process: (1) What are the characteristics of patients recommended by psychiatrists to be returned to full military duty? (2) What are the characteristics of those patients who are successful in their military adjustment after return to duty?

Characteristics of Navy Personnel Returned to Duty

Psychiatrists recommended for RTD those patients whom they judged to be capable of working successfully in the naval organization after hospitalization. Understanding the bases for the psychiatrist's decisions required an examination of the characteristics of those men selected to be RTD. Table 4 summarizes the variables in this study which had stable correlations with RTD decisions (significant in both the validity and cross-validity samples). Four types of variables were examined: (1) personal history, (2) attitudes, (3) service history, and (4) medical history.

Personal History. Of all the personal history variables, age had the highest correlation with RTD decisions for Navy men. Marital status (married) and number of children similarly were positively correlated with RTD, and these variables were highly correlated with age (.48 and .60, respectively). Items reflecting status of the patient's parents (not together or not living) also were related to RTD; these variables had low to moderate correlations with age (.22 and .37, respectively). Wife living at the man's duty station was significantly correlated with RTD, but this relationship may be largely accounted for by the man's age and marital

Table 4

Correlations Between Predictor Variables and Return to Duty[a]

Navy Patients (NRTD = 0, RTD = 1)

Variable	Correlation	
	Sample 1 (N = 1412)	Sample 2 (N = 1412)
Personal History:		
Age[b]	.32	.26
Ever married (No = 1; Yes = 2)	.18	.18
Number of children	.20	.18
Wife at duty station (Not married = 1; No = 2; Yes = 3)	.20	.18
Parents living (Yes = 1; No = 2)	.12	.12
Parents together (Yes = 1; No = 2)	.08	.12
Attitudes:		
Perception of wife's attitude toward service (Single = 1; Negative = 2; Neutral = 3; Positive = 4)	.21	.16
Command recognizes your abilities (No = 1; Yes = 2)	.12	.20
Service History:		
Years of service	.33	.29
Pay grade	.32	.32
Career designated (No = 1; Yes = 2)	.30	.29
Broken service (No = 1; Yes = 2)	.14	.11
Job specialty (deck, construction = 1; electronics, engineering, medical = 2; ordnance, administrative & clerical, aviation, steward = 3)	.19	.14
Number you supervise	.22	.20
Number you work with	.10	.09
How often do you stand watch (Never or 3 times or more per week = 1; 1 or 2 a month or 1 or 2 per week = 2)	.06	.07
Percent of time you work in your rate	.08	.12
Age you entered service	.09	.13
Failed promotion (No or not eligible = 1; Yes = 2)	.09	.11
Received awards (No = 1; Yes = 2)	.12	.16
Court martial (Yes, in the past year = 1; More than a year ago = 2; Never = 3)	.14	.10
Continuing education (No = 1; Yes = 2)	.09	.11
Service schools (None = 1; A = 2; A and B or A and C = 3; A, B, and C or B and C = 4)	.24	.21

[a]Only variables with statistically significant correlations ($p < .05$) in both the validation and cross-validation samples were included. Correlations were computed by the Pearson product-moment method.

[b]Unless the variable categories are specified, the variable was treated as a continuous variable. Variables with multiple categories were linearized by ordering and grouping categories in terms of criterion values.

Variable	Correlation	
	Sample 1	Sample 2
Medical History:		
Days in hospital	-.36	-.47
Diagnosis (Psychosis = 1; Character and Behavior Disorder = 2; Neurosis = 3; Situational Maladjustment = 4)	.37	.38
Health change since enlistment (Worse = 1; Same = 2; Better = 3)	.14	.18
Any prior psychiatric contact (Several problems or disciplinary or emotional reasons = 1; No, clearance for special program, difficulty getting along, other reason = 2)	.08	.06

Marine Corps Patients

	Sample 1 (N = 769)	Sample 2 (N = 772)
Personal History:		
Age	.13	.17
Wife at duty station (Single = 1; No = 2; Yes = 3)	.10	.11
Attitudes:		
Command recognizes your problems (No = 1; Yes = 2)	.16	.12
Command recognizes your abilities (No = 1; Yes = 2)	.12	.15
Service History:		
Pay grade	.19	.20
Years of service	.15	.16
Career designated (No = 1; Yes = 2)	.12	.08
Received awards (No = 1; Yes = 2)	.10	.08
Service schools (No = 1; Yes = 2)	.09	.10
Number you supervise	.08	.11
Medical History:		
Days in hospital	-.48	-.48
Diagnosis (Psychosis = 1; Character and Behavior Disorder = 2; Neurosis = 3; Situational Maladjustment = 4)	.44	.47
Prior psychiatric contact (Yes, emotional or disciplinary problems = 1; No, or any other reason = 2)	.09	.08

status. Overall, the personal history variables correlating with RTD suggested a pattern of maturity and stability.

Attitudes. Two attitudinal variables were related to RTD decisions: (1) the patient's perception of his wife's attitude toward service, and (2) the patient's perception of whether his previous command recognized his abilities.

Service History. Of the service history variables, years of service and pay grade were most highly correlated with RTD. Stated intention to make the naval service a career (career designate) was the next most important variable. Career intention was highly correlated with years of service ($r = .63$). Type and number of service schools completed and number of men supervised at one's last duty assignment also were positively correlated with RTD decisions. No disciplinary record was positively related to RTD while receiving an award was positively related. In general, service history variables reflecting longevity, commitment to a service career, and superior performance were positively correlated with RTD.

Medical History. Of all variables studied, diagnosis and length of hospitalization were most highly correlated with RTD. Patients with less severe diagnoses (Situational Maladjustment or Psychoneurosis) and with shorter periods of hospitalization were much more likely to be returned to duty than others. A belief that general health was better than at enlistment and no prior history of psychiatric problems also were significantly correlated with RTD.

Characteristics of Marine Corps Personnel Returned to Duty

Personal History. Two personal history characteristics of Marine Corps patients were related to RTD decisions: age and marital situation. Men who were married and had their wives living with them were more likely to be

returned to duty than single men. The marital situation variable was moderately correlated with age (r = .42).

Attitudes. Marines who felt that their previous commands (1) recognized their abilities and (2) recognized their problems were more likely to be returned to duty than other Marines. These two attitudinal variables were intercorrelated .46.

Service History. Of the service history variables, pay grade and length of service were the strongest indicators of RTD decisions. As with Navy men, career intentions, service school attendance, receiving awards, and supervising others were positively correlated with RTD. In general, Marines with more experience, responsibility, and apparent commitment were selected for RTD.

Medical History. Diagnosis and length of hospitalization appeared to be of overriding importance in RTD decisions for Marines. Again, as with Navy patients, Situational Maladjustment or Neurosis and a short period of hospitalization were highly associated with RTD. No prior psychiatric problems also was a significant indicator for Marines.

Characteristics of Effective Navy Patients

The next phase of the analysis was to determine characteristics of patients who were effective after being returned to duty. The biographical and attitudinal variables utilized in the previous RTD analysis were correlated with post-hospital success or failure. These results are summarized in Table 5.

Personal History. Age, marital status, and number of children were indicators of post-hospital success among Navy men. Also, wife living at the man's duty station was positively correlated with success. It seems clear that generally family responsibilities were related to success.

Table 5

Correlations between Predictor Variables and Post-Hospital Effectiveness

Variable	Navy Patients (Failure = 0, Success = 1) Correlation	
	Sample 1	Sample 2
Personal History:	(N = 395)	(N = 395)
Age	.30	.26
Ever married (No = 1; Yes = 2)	.27	.16
Number of children	.23	.23
Wife at duty station (Not married = 1; No = 2; Yes = 3)	.30	.16
Size of town in which member lived before age 12 (Large town = 1; Small town = 2)	.17	.12
Attitudes:		
Perception of wife's attitude towards service (Single = 1; Negative or neutral = 2; Positive = 3)	.30	.12
Command recognizes your abilities (No = 1; Yes = 2)	.13	.20
Command recognizes your problems (No = 1; Yes = 2)	.17	.12
Service History:		
Pay grade	.34	.36
Years in service	.31	.28
Attended service schools (No = 1; Yes = 2)	.28	.26
Career designated (No = 1; Yes = 2)	.25	.26
Number you supervise	.21	.16
Had a mast in the last year (Yes = 1; No = 2)	.22	.16
Ever stood a court-martial (Yes = 1; No = 2)	.20	.17
Job specialty (deck, engineering, construction, aviation, medical or steward = 1; ordnance, electronics or administrative and clerical = 2)	.13	.14
Duty before hospitalization (CONUS, PAC or LANT Fleet = 1; PAC or LANT Shore = 2)	.12	.20
Medical History:		
Diagnosis (Character and Behavior Disorder = 1; Neurosis, Psychosis, or Situational Maladjustment = 2)	.21	.19
	Marine Corps Patients	
Personal History:	(N = 294)	(N = 293)
Age	.28	.25
Race (Negroid = 1; Other = 2; Caucasian =3)	.22	.19
Education	.14	.20
Service History:		
Pay grade	.29	.29
Years of service	.15	.19
Medical History:		
Number of days hospitalized	-.14	-.18

Another variable correlated with success was the size of the town in which the patient spent his childhood. Men from small towns were more likely to succeed than men from large metropolitan areas.

Attitudes. The patient's perceptions and attitudes were significant indicators of effectiveness among Navy men. If the man perceived his wife's attitude toward the service as favorable, he was likely to succeed. If the Navy man felt that his previous command was aware of his strengths and weaknesses, he was likely to readjust effectively when he returned to his Navy occupation. Thus, the more supportive the individual believed his marital and work relationships to be, the more likely he was to be successful after hospitalization.

Service History. Pay grade, length of service, service school attendance, and career intentions were most highly related to success of the service history variables. In addition, number of men supervised and an absence of disciplinary problems were indicative of success. In general, therefore, effectiveness after hospitalization was related to experience, skill, responsibility, commitment, and effectiveness before hospitalization.

Occupational specialty and type of duty assignment also were related to post-hospital effectiveness. Men in electronics, administrative and clerical, and ordnance jobs tended to be successful more often than men in other jobs. Men in overseas shore assignments had a higher effectiveness rate than men in other assignments.

Medical History. Of the medical history variables, only diagnosis was related to effectiveness among Navy patients returned to duty. Patients diagnosed Character and Behavior Disorder were less likely to be effective than patients with other diagnoses.

Characteristics of Effective Marine Corps Patients

Personal History. Age, racial or ethnic group, and education were significantly related to post-hospital effectiveness among Marine Corps personnel. Men in higher levels of age and education and those classified as Caucasians were more likely to be successful. Age and education were significantly intercorrelated in this patient sample, but neither of these variables was related to racial group.

Attitudes. None of the attitudinal variables was related to success among Marines.

Service History. Pay grade and length of service were the only service history variables related to effectiveness among Marines returned to duty.

Medical History. The only medical history variable correlated with success was the number of days hospitalized. The longer the man was hospitalized, the less likely it was that he would be successful after hospitalization.

Discussion

Diagnosis and length of hospitalization, presumably reflecting severity of illness, were the most important determinants of RTD decisions for both Navy and Marine Corps personnel. Job experience, responsibility, and service commitment were significant correlates of RTD for both sailors and Marines; these variables were relatively more important for sailors.

Attitudinal variables were significant for RTD decisions in both groups: perceptions of wife's attitude toward service and of superiors' recognition of abilities were correlated with RTD in the Navy group while perceptions of superiors' recognition of abilities and superiors' recognition of problems were relevant for the Marines.

In general, the variables that were most important for RTD decisions

were also most highly correlated with success. This result suggests a substantial degree of validity in the psychiatric decision-making process.

The principal variables that significantly predicted success for Navy men, but not for Marines, included town size, attitudinal variables, and disciplinary record; conversely, variables that were significant for Marines but not for Navy men were racial group and education.

In terms of the number and diversity of variables correlating with RTD and effectiveness, outcomes for Navy personnel appeared to be somewhat more predictable than those for Marine Corps personnel. Differences in population characteristics, such as age range, marital status, and occupational diversity, may have affected the relative predictability of the two groups.

It appears that more careful screening of patients would lead to a smaller failure rate, generally minimizing the risk that men would encounter in returning to duty. The task remains to develop clinical and administrative actuarial tables which can assist those who make decisions concerning return to duty.

III. CLINICAL AND ADMINISTRATIVE ACTUARIAL TABLES

Two stages of decision-making can be considered in the determination of disposition for psychiatric patients. Initially, psychiatrists must designate those patients who have the most favorable service and clinical histories and recommend that they be returned to duty (RTD), while indicating that all others be separated from the service (NRTD). Secondly, the psychiatrists' recommendations are reviewed by those in the administrative hierarchy and are either accepted or rejected. The factors which affect the initial clinical decisions can be expected to differ from those factors which affect the administrative decisions. Diagnosis, for example, would be important information for the initial clinical decision, but once the recommendation for RTD

or NRTD had been made, other variables might be more useful in further differentiating post-hospital prognosis.

The correlates of positive RTD recommendations and post-hospital effectiveness are similar. This result would suggest that initial RTD recommendations generally are valid and that those selected have the best prospects for success. It was possible, however, to take an additional step in order to refine disposition recommendations. Of those patients recommended for RTD, a further discrimination can be made between potential success and failure based upon new items of information. Thus, two tables were derived: (1) the first presents probabilities for post-hospital success when all psychiatric patients are considered, and (2) the second presents probabilities for post-hospital success when only those cases selected for RTD are considered. These actuarial tables make possible a two-fold selection process, requiring that the clinical (RTD vs. NRTD) decision be made first, followed by an administrative review which is based upon a second set of factors.

Procedure

Two analyses were performed. In the first phase, variables were identified which predicted, for the patient population as a whole, a successful return to duty. The most important of these variables were used to develop actuarial statements (Clinical Odds Scores) that might be used by the clinician in making disposition recommendations.

Then, given only patients recommended for RTD, a further determination was made of variables that distinguished between post-hospital successes and failures. Variables which uniquely and importantly contributed to the prediction of success were used to develop actuarial statements (Administrative Odds Scores) that provided a second step for evaluating RTD potential.

In both phases of the study, the patient population was divided into two subsamples of nearly equal size for purposes of validation and cross-validation. The validation group was utilized for linearizing the predictor-criterion relationships and for developing prediction equations by means of the multiple regression procedure. The cross-validation groups were used for testing the validities of the derived equations in each phase. These variables which strictly fit the linear multiple regression model were used to compute actuarial scores showing the probability of naval effectiveness in each of the two phases after the model provided by Plag and Goffman.[6]

Results

Phase I: Clinical Odds Scores

Navy Personnel. Table 6 summarizes the unique predictors of RTD recommendations which were significantly related to post-hospital success in the total clinical population. For all Navy patients the optimal solution resulted in the identification of 14 variables, producing a multiple regression coefficient (R) of .60.

Use of the significant intervals within those 14 variables would produce a table of actuarial odds with 5,598,720 entries. This is more information than the psychiatrist could readily use. The actuarial tables are based, therefore, on the three most unique and statistically powerful variables (identified by an asterisk in Table 6). Using those three only, the multiple correlation was .56 and the cross-validation coefficient was .55. This system resulted in 60 actuarial statements (Table 7) or prediction scores.

Marine Corps Personnel. Essentially, the same was true for the Marine Corps sample. The optimal statistical solution resulted in 12 variables (R = .52) shown in Table 8. This solution also would produce a cumbersome table (110,592 statements). Using the three most powerful variables

Table 6

Variables that Predict Post-Hospital Success
for the Total Navy Psychiatric Patient Population[a]

Variable	Discriminating Intervals	% of Total Sample[b]	% Success
*1. Years of service	15 - 40	6	71
	10 - 14	7	41
	4 - 9	15	27
	2 - 3	19	14
	≤ 1	53	9
*2. Diagnosis	Situational Maladjustment	8	67
	Neurosis	17	25
	Character & Behavior Disorder	64	11
	Psychosis	11	7
*3. Days in hospital	≤ 30	53	28
	31 - 60	27	11
	61+	20	5
4. Wife's attitude toward service	Positive	4	59
	Neutral, negative	27	30
	Not married now	69	11
5. Number of children	Married with 2 or more	13	42
	Married with 0 or 1	21	24
	Never married	66	11
6. Service schools completed	A + B + C	3	71
	A + B; A + C; B or C	13	38
	A	22	22
	None	62	10
7. Why previously saw psychiatrist	Never, clearance only	59	21
	Any other reason	41	15
8. When court-martialled	3+ years ago	2	61
	1 - 3 years ago; never	90	18
	Within past year	7	5
	Within past year and also before	1	0
9. Size town resided in under age 12	Town (under 50,000)	42	23
	Farm; city 50,000 - 500,000	40	16
	City 500,000+	18	11
10. Plan to make service career	Yes	15	51
	No	85	12
11. Duty station	PAC shore, LANT shore	11	29
	CONUS, PAC Fleet	66	19
	LANT Fleet	23	12
12. Education	Up to 9 years; 11 - 12 years	68	21
	10 Years	12	14
	Above high school	20	10
13. Health changed since entering service	Better; no change	47	24
	Worse	53	13
14. Wife at duty station	Yes	4	58
	No	27	21
	Not married now	69	11

[a]Variables from the original 54 which discriminated significantly and which cross-validated significantly for predicting to the effectiveness criterion for all enlisted Navy and Marine Corps personnel admitted to the psychiatric service. Asterisks identify the three most discriminating variables. The intervals shown represent the best linear ordering of the variable categories for discriminating success.

[b]Total sample size was 2,446 (inter-hospital transfers removed).

Table 7

Clinical Odds Scores for Total Navy Psychiatric Population

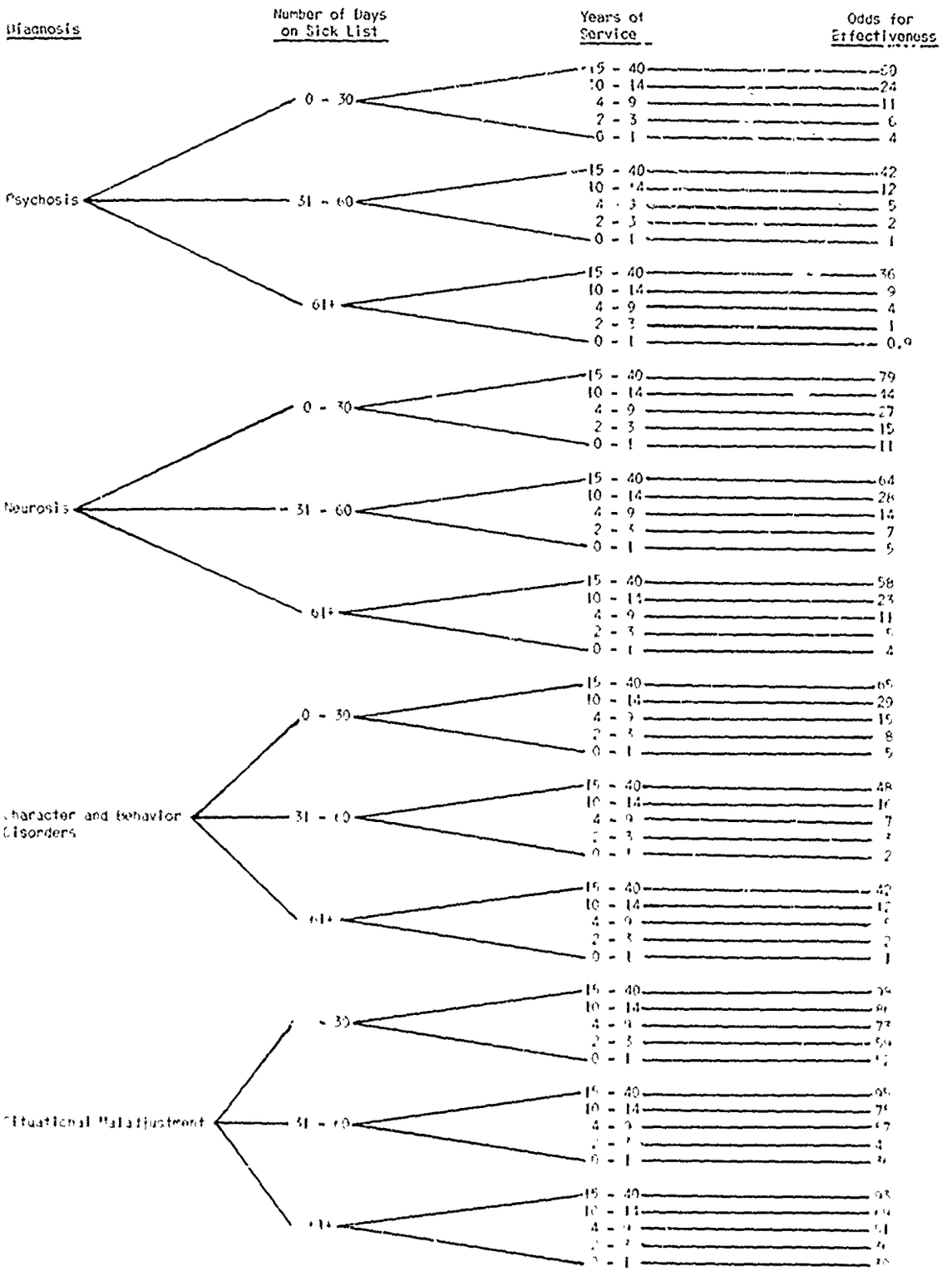


Table 8

Variables that Predict Post-Hospital Success
for the Total Marine Psychiatric Patient Population[a]

Variable	Discriminating Intervals	% of Total Sample[b]	% Success
*1. Days in hospital	≤ 7	25	38
	8 - 14	12	28
	15 - 30	18	20
	31+	45	5
*2. Diagnosis	Situational Maladjustment	14	46
	Neurosis	15	28
	Character and Behavior Disorder	61	12
	Psychosis	10	4
*3. Age	19 - 65	76	23
	17 - 18	24	7
4. Job specialty	Maintenance; clerical	20	30
	Infantry; armor, artillery, engineer electronics; general technical	67	18
	Radio	13	11
5. Why previously saw psychiatrist	Clearance; never	63	23
	Difficulty getting along with fellow Marines; other emotional problems; other reasons	28	15
	More than one reason	8	5
	Disciplinary trouble	1	0
6. Race	All others	84	20
	Negroid	16	10
7. Region in which raised	South; So. Atlantic; So. Central; Great Lakes	49	24
	New England; Pacific	18	19
	North Atlantic; North Central; Rocky Mountain	33	13
8. Number of admissions to sick list	0 - 1	67	21
	2 or more	33	13
9. Pay grade	E-3 through E-9	43	29
	E-2	34	14
	E-1	23	8
10. Size town resided in after age 12	150,000 - 500,000	14	28
	All others	86	17
11. Number of clubs joined	2 or more	15	28
	0 or 1	85	17
12. Failed test for promotion	No; not eligible	95	20
	Yes	5	5

[a]Variables from the original 54 which discriminated significantly and which cross-validated significantly for predicting to the effectiveness criterion for all enlisted Navy and Marine Corps personnel admitted to the psychiatric service. Asterisks identify the three most discriminating variables. The intervals shown represent the best linear ordering of the variable categories for discriminating success.

[b]Total sample size was 1,492 (inter-hospital transfers removed)

(identified by an asterisk in Table 8) the multiple correlation was .45 and the cross-validation coefficient was .40. These three variables resulted in 32 actuarial statements (Table 9).

Phase 2: Administrative Odds Scores

Navy Personnel. In order to examine the RTD patients for effectiveness (E), the multiple regression procedure was repeated only for the RTD patients. For the Navy, 11 variables (Table 10) were significant (R = .52). The three most statistically powerful (identified by an asterisk) produced a multiple correlation of .45 and a cross-validation coefficient of .40. This system produced 24 actuarial statements (Table 11), as opposed to the 9,216 if all 11 variables were used.

Marine Corps Personnel. For the Marine Corps sample, 12 variables listed in Table 12 produced an R of .56. All 12 would produce 13,056 actuarial statements. The three most powerful variables (identified by an asterisk in Table 12) produced an R of .41 and a cross validation r of .38. These three produced 24 statements (Table 13).

Discussion

Clinical Odds

An examination of the clinical tables (Table 7 for Navy and Table 9 for Marines) revealed the following:

(1) odds for RTD effectiveness varied with diagnosis: Situational Maladjustment cases were highest and Psychosis lowest;

(2) the longer a man was in the hospital, the poorer his chances for an RTD recommendation and successful post-hospital adjustment, and

(3) a career-oriented history was positively related to success for the Navy, whereas, the analysis for the Marines produced a distinction between the very young Marine (17 - 18) and all others.

Table 9

Clinical Odds Scores for
Marine Corps Psychiatric Population

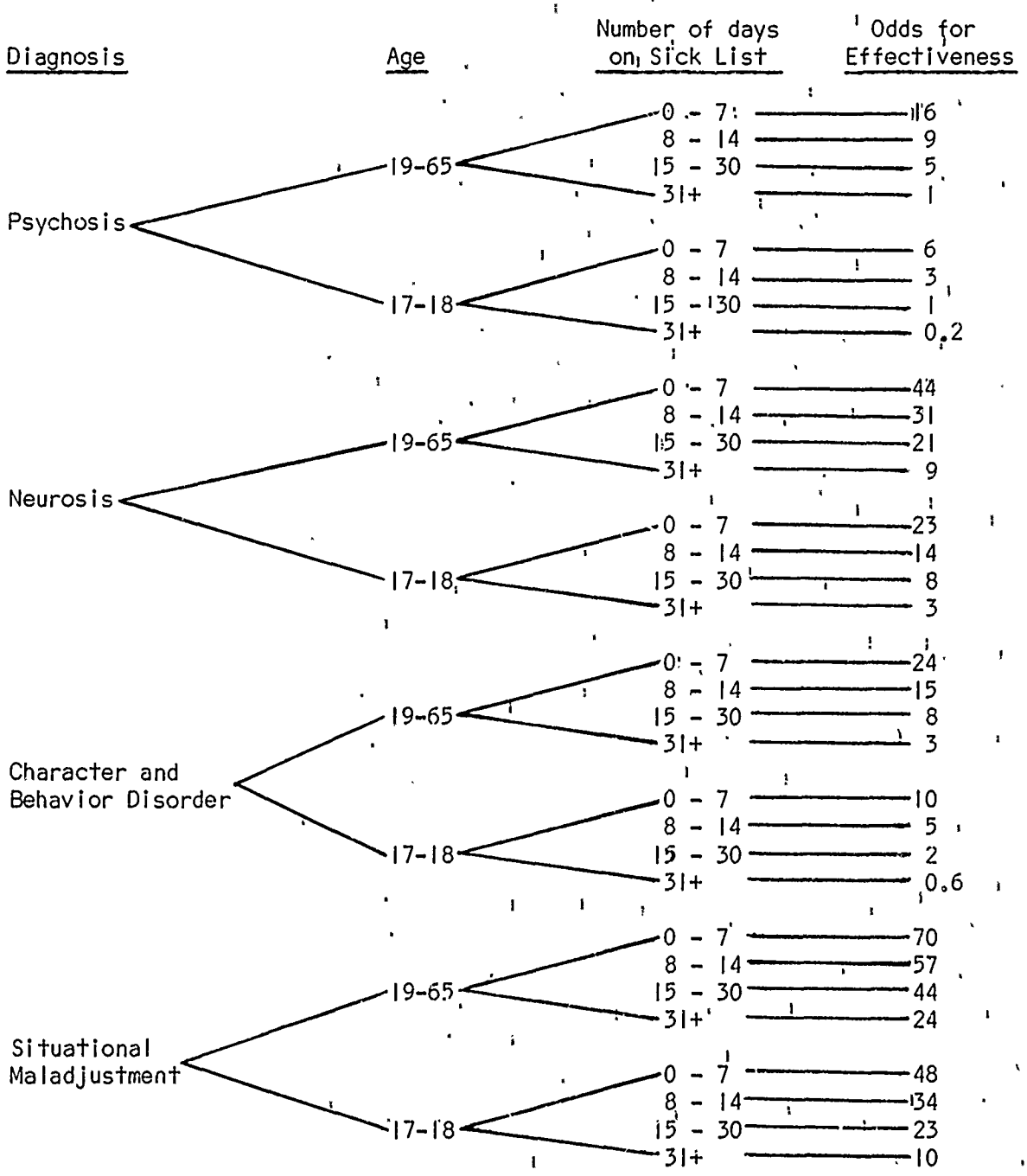


Table 10

Variables that Predict Post-Hospital Success for Navy Psychiatric Patients Returned to Duty[a]

Variable	Discriminating Interval	% of Total Sample[b]	% Success
*1. Pay grade	E-8 through E-9	2	100
	E-6 through E-7	21	85
	E-3 through E-5	57	61
	E-1 through E-2	20	37
*2. Disciplinary Office Hours or Captain's Mast in past year	No	75	69
	Yes	25	44
*3. Wife's attitude toward service	Positive	9	91
	Neutral, Negative	35	75
	Not married now	56	50
4. Religion	Catholic; Jewish; Methodist; Presbyterian; Other	55	67
	Episcopalian; Lutheran; Baptist; Congregationalist; None	45	56
5. Ever fired	No; left because work ran out; No prior job	92	64
	Yes	8	38
6. Size town resided in after age 12	Under 150,000	73	66
	Over 150,000	27	49
7. Days in hospital	Raw scores used		
8. Diagnosis	Psychosis; neurosis; situational maladjustment	50	71
	Character and Behavior Disorder	50	50
9. Failed test for promotion	Yes	20	83
	No, not eligible	80	56
10. Age at father's death	1 - 9 years	3	100
	21 years	10	77
	10 - 14 years; father living	86	59
	15 - 20 years	1	17
11. Service schools completed	A + B + C	6	92
	Less than above	48	70
	None	46	47

[a]Variables from the original 54 which discriminated significantly and which cross-validated significantly for predicting to the effectiveness criterion for all enlisted Navy and Marine Corps personnel RTD from the psychiatric service. Asterisks identify the three most discriminating variables. The intervals shown represent the best linear ordering of the variable categories for discriminating success.

[b]Total sample size was 790.

Table 11

Administrative Odds Scores for Navy RTD Patients

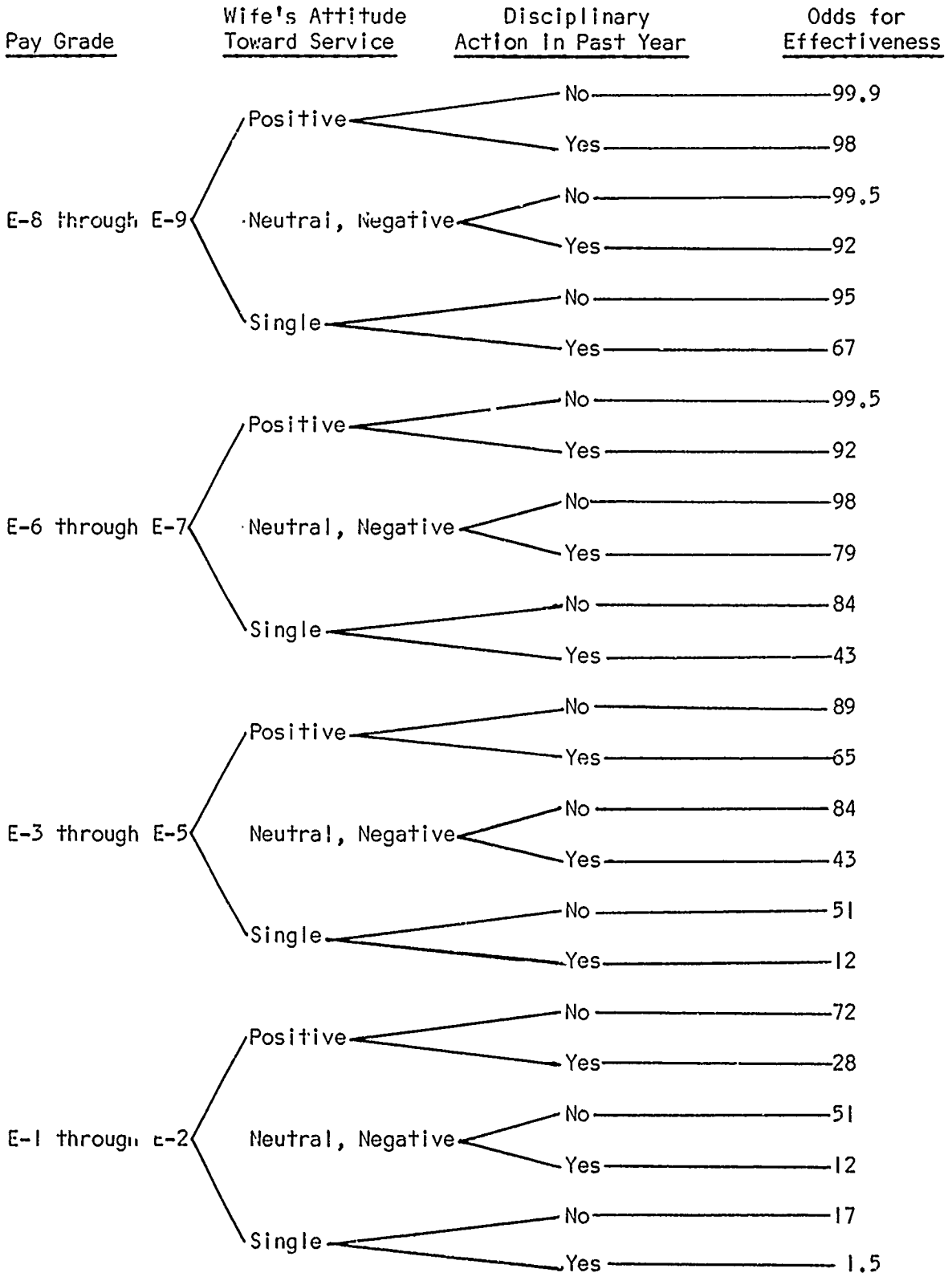


Table 12

Variables that Predict Post-Hospital Success
for Marine Psychiatric Patients Returned to Duty[a]

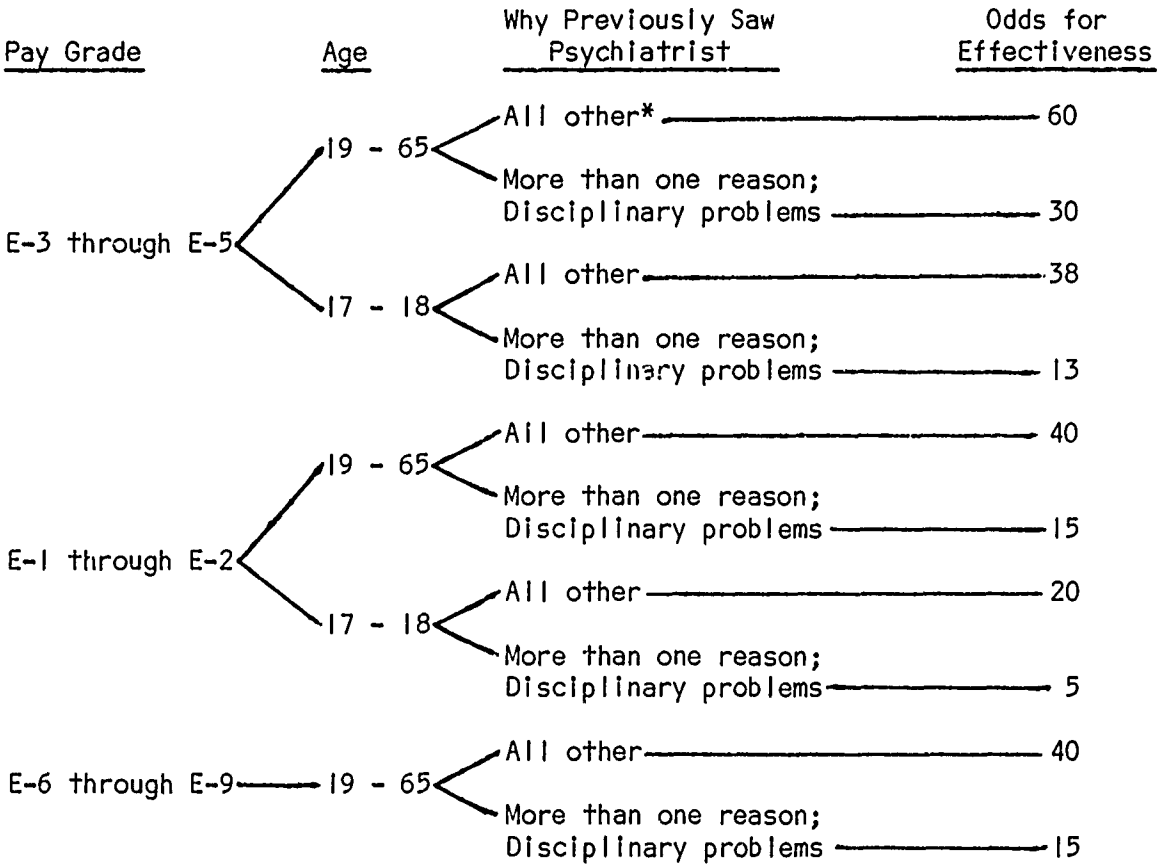
Variables	Discriminating Intervals	% of Total Sample[b]	% Success
*1. Pay grade	E-3 through E-5	46	64
	E-1 through E-2; E-6 through E-9	54	34
*2. Age	19 - 65	78	56
	17 - 18	22	21
*3. Why previously saw psychiatrist	Clearance; difficulty getting along with fellow Marines; emotional problems; other reason; never	93	50
	Disciplinary trouble; more than one reason above	7	15
4. Race	All others	84	52
	Negroid	16	23
5. Job specialty	Armor; artillery; engineer; radio	23	33
	All others	77	53
6. Days in hospital	30 or less	82	51
	30+	18	33
7. Service schools completed	2 - 3	14	69
	0 - 1	81	46
	4 or more	5	33
8. Number of pre-service jobs	0 - 3	89	52
	4 - 9	10	30
	10 or more	1	0
9. Father's occupation	Clerical; farmer; military	16	30
	All others	84	51
10. Age at entering service	19 - 65	31	62
	18	34	47
	17	35	36
11. Number of prior hospitalizations	0 - 3	95	50
	4 or more	5	14
12. Disciplinary Office Hours or Captain's Mast in past year	No	66	52
	Yes	34	40

[a]Variables from the original 54 which discriminated significantly and which cross-val dated significantly for predicting to the effectiveness criterion for all enlisted Navy and Marine Corps personnel RTD from the psychiatric service. Asterisks identify the three most discriminating variables. The intervals shown represent the best linear ordering of the variable categories for discriminating success.

[b]Total sample size was 587.

Table 13

Administrative Odds Scores for
Marine Corps RTD Patients



*Includes application to a speical program which requires psychiatric clearance; difficulty getting along with others; nervous or emotional trouble; other reasons; and never saw a psychiatrist previously.

These tables used clinical data (diagnosis and length of hospitalization) as the most powerful predictors.

Administrative Odds

The administrative tables (Tables 11 and 13 for the Navy and Marine Corps respectively) produced different pictures. It should be noted that clinical variables do not appear in the administrative tables. The clinical information entered into the RTD decision to produce the patient population upon which the administrative tables are based, and, hence, are no longer discriminating.

For the Navy, (1) service investment (pay grade), (2) being married and seeing wife's attitude toward service as positive, and (3) having had no disciplinary problems for the past year were indicators of effective post-hospital adjustment, the range of which was from 99.9 percent success to 1.5 percent. For the Marine patients, a more limited degree of discrimination could be achieved (60 percent success to 5 percent) with (1) pay grade, (2) age (17 - 18 years vs. all others), and (3) previous psychiatric contact determining the odds scores.

It appeared from an inspection of the tables that post-hospital adjustment generally was superior for the Navy men. It was especially noted in Table 13 that Marine patients who had high enlisted rank (pay grades E-6 through E-9) could not readily readjust to the demands of the Marine Corps after hospitalization. A patient of intermediate status in the command structure (E-3 through E-5) was the most successful. The Navy, on the other hand, apparently can benefit most by returning its senior men (E-6 through E-9) to duty after hospitalization.

Impact of the Application of Odds Scores

To determine the result of using the Odds Scores, the clinical and

administrative tables were applied to the RTD samples for the Navy and Marine Corps. Only those cases with all relevant data complete could be used in the analysis. For these analyses an odds score greater than 50 was considered indicative of a sound clinical recommendation or administrative review decision.

If the joint odds were considered, the Effectiveness (E) rate for the Navy would change from 62 percent to 83 percent, and for the Marine Corps from 48 percent to 75 percent. These increases essentially reflect the elimination of those men who could have been identified as poor risks for RTD before the decision was made, but applying the clinical and administrative odds scores eliminates 49 percent of the sailors and 38 percent of the Marines who could succeed at duty.

If it is assumed that the clinical odds should not be applied to the RTD sample, the picture again changes. The assumption is tenable in that the clinical factors had already been considered in the RTD decision. Applying only the administrative odds to the RTD samples to determine who should be returned to duty, the Navy sample would produce 352 successes (74 percent) and 125 failures against 450 successes (62 percent) and 260 failures in the actual sample. The Marine Corps sample, using odds scores, would produce 146 successes (67 percent) and 71 failures against 265 successes (48 percent) and 290 failures.

These figures indicate that the odds scores can provide additional useful information for disposition of psychiatric patients from the hospital while maintaining adequate success rates and reducing the number of failures in the system.

Use of the Odds Scores

Clinical Odds Scores

It is not recommended that actuarial odds scores alone be used to determine disposition from a psychiatric hospitalization. For example, the clinical tables would indicate that a psychotic patient should not generally be recommended for RTD. Yet, 9 percent of the psychotic population were returned to duty and had an overall effectiveness rate equal to that for Situational Maladjustment patients (70 percent).

The tables could serve as one input to the clinical decision process. If the odds were low for a patient, the decision to recommend RTD might be made with great care, and the screening of low-odds patients be made with careful selectivity, as was done in the category of Psychosis. If the odds for an RTD recommendation were high, care might be taken in the decision to separate a man from the service, especially if that man has a substantial career investment in the service.

Administrative Odds Scores

The administrative tables could be used to review primary clinical recommendations. If the administrative odds were high, the chances of a clinical RTD recommendation producing naval effectiveness are good. If the odds were low, a careful review of an RTD recommendation might be indicated and a recommendation to separate the man from service (NRTD) might be appropriate.

IV. SUMMARY

In a study of psychiatric decisions in Navy psychiatry, a large-scale prognostic research project was initiated on Navy and Marine Corps enlisted men admitted to Navy psychiatric facilities during 1967-68. The three major objectives of the study were: (1) to examine the decisions concerning

disposition of Navy and Marine psychiatric patients and to develop guidelines for such decisions, (2) to determine post-hospital outcomes for men returned to duty after psychiatric hospitalization, and (3) to identify patient characteristics predictive of post-hospital success, and to develop prognostic equations and actuarial tables in order to maximize post-hospital success rates. In general, items reflecting standard demographic information and background information provided a sound basis from which prognostic scales could be derived.

Diagnosis, length of hospitalization, age, pay grade, and length of service were the most important correlates of hospital disposition and post-hospital effectiveness. Other personal history and attitudinal variables had different implications for outcomes in the Navy and Marine Corps patient populations. It is considered feasible to construct predictive equations and tables to aid psychiatric selection decisions for each group separately.

Predictors (1) of successful RTD recommendations from the total hospital psychiatric patient population and (2) of effectiveness of those recommended for return to duty were used to produce actuarial odds scores in clinical and administrative tables. The scores reflect actual rates of effective adjustment to service after a psychiatric hospitalization, and, hence, represent feedback to the psychiatrist and administrator concerning outcomes of their decisions. The essential task in the decision process appears to be to minimize the risk of failure for the patients who are returning to service as well as to meet the needs of the service. It was proposed that clinical and administrative odds scores could provide one form of useful input to the complex psychiatric decision process.

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